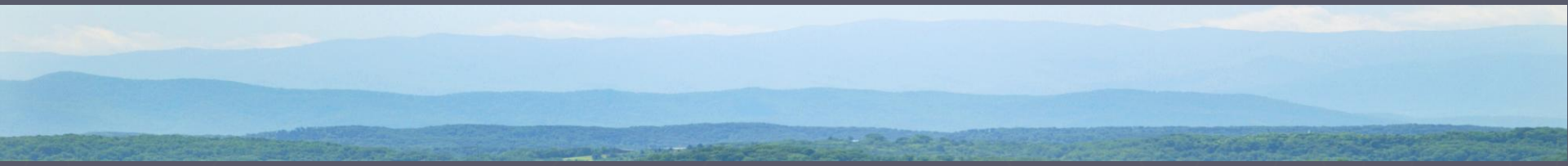
Federation of Earth Science Information
Partners Meeting

July 21, 2010

Initiating Sustainability in the City of Knoxville: Progress and Needs

Erin Burns, City of Knoxville

Sustainability Goals for Knoxville



- Reduce vulnerability to rising energy prices
- Provide transportation choices and reduce congestion
- Reduce environmental impact
- Preserve and protect natural beauty
- Pursue economic development

→ Quality of life
→ Competitiveness
→ Stewardship

Instigating Sustainability:

City Government Operations
&
Community Influence

Energy & Sustainability Task Force

Members

- University of Tennessee
- TVA
- KUB
- ORNL
- US Green Building Council
- Southern Alliance for Clean Energy
- MPC
- City Council
- Public Building Authority
- Knox County
- Alcoa Aluminum
- Knoxville Community Development Corporation
- Knoxville Chamber
- Foundation for Global Sustainability
- LEAF

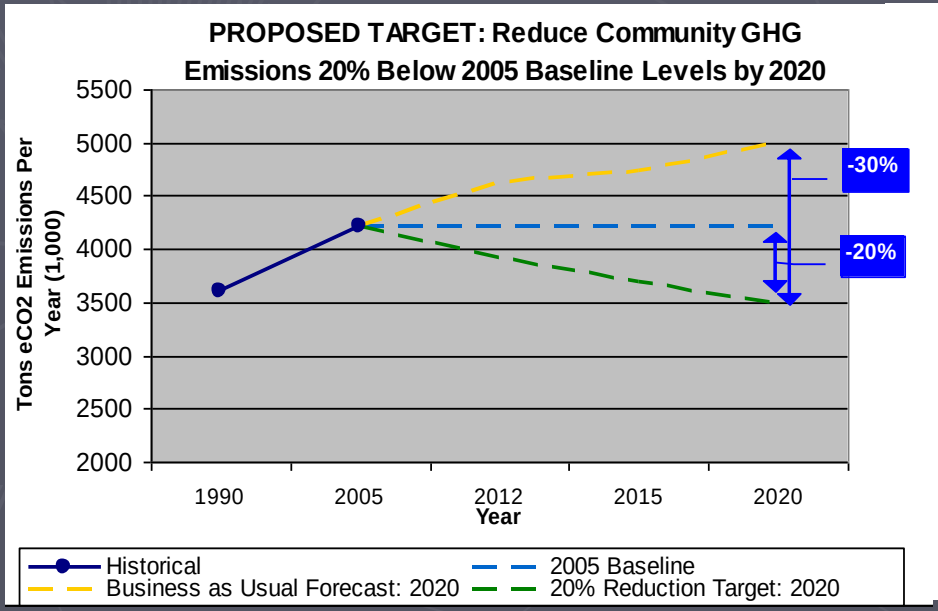
Energy & Sustainability Task Force

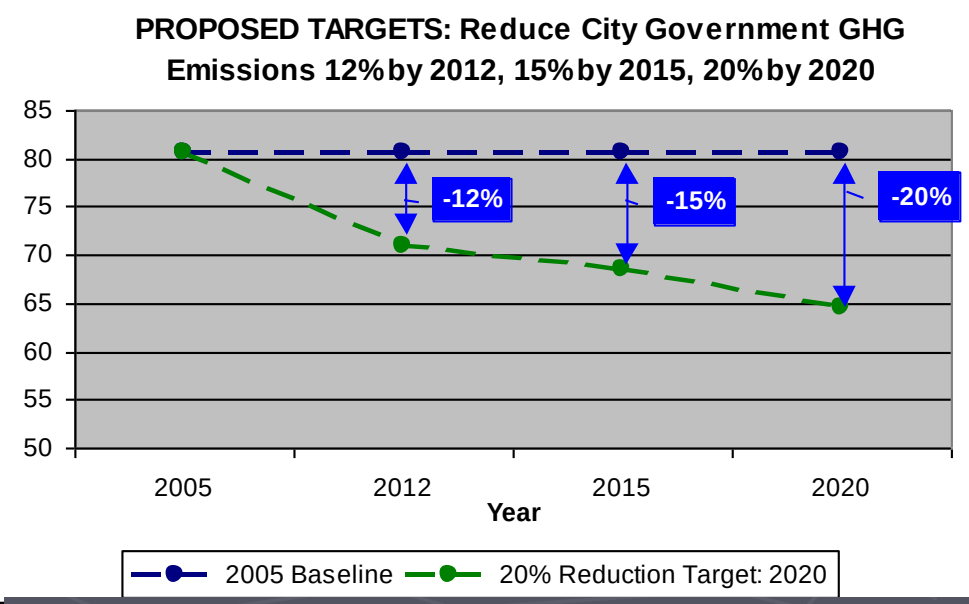
Spearheaded Energy and Emissions Inventory

- Final Report released in 2009, based on 2005 data

Developed recommendations

- To reduce City and Community energy consumption/emissions





City Government Goals

- Reduce energy / water consumption in city facilities
- Improve efficiency of traffic signals / streetlights
- Ensure new facilities are energy efficient & cost less to operate
- Reduce municipal waste & purchase responsibly
- Reduce City fleet fuel consumption/emissions/maintenance
- Support KAT's environmental efforts
- Reduce commute vehicle-miles-traveled by city employees

Community Goals

- Reduce transportation-related fuel consumption and emissions
- Improve the energy efficiency of local homes and buildings
- Increase amount of renewable energy powering the grid
- Ensure the quality and quantity of local water supplies
- Reduce the amount of waste sent to the landfill; recycle wherever possible
- Integrate sustainability into development / job creation
- Encourage community engagement in sustainability efforts

City Data Need

- Measurement and verification of emissions reductions?
- What's the best way to track progress of energy and sustainability initiatives?
- What's the best performance measure we can use without spending on not only software but also staff to monitor it?
- Need an annual benchmark to show progress and modify actions accordingly.

Following Through:

How to Reach Our Goals?

Task Force: Community Involvement Group

- Marketing: How can we reach the community?
  - Ameresco: Publicize progress / share lessons-learned
  - EECBG: Progress Reporting / community involvement
- Incentives / Program Participation Drivers:
  - Market / educate about the importance of renewable energy
  - Formalize clean energy business, job development strategy
- Leveraging: How can we sustain sustainability?
  - Develop other targeted community engagement strategies

City Data Need

- What's the best way to interact with the Community?
- How can we dialogue as opposed to simply pushing information out on a website?
- ORNL and utility partnership is exploring how to create interactive website for apples-to-apples comparison between citizen utility usage..

Task Force: Energy Group

- Financing: making retrofits affordable
  - Packages that encourage commercial retrofitting
- Energy Efficient Lighting: Changing a mindset
  - LED: Evaluate options for streetlight upgrades and implement
- Education: changing the mindset of a community who has enjoyed cheap energy in a mild climate

City Data Need

- How to properly determine (and communicate) value of energy retrofits through appraisal, bill reduction, and home quality?

- Where are the community's greatest needs for energy improvement – sector and industries, and what incentives will drive change in those sectors.

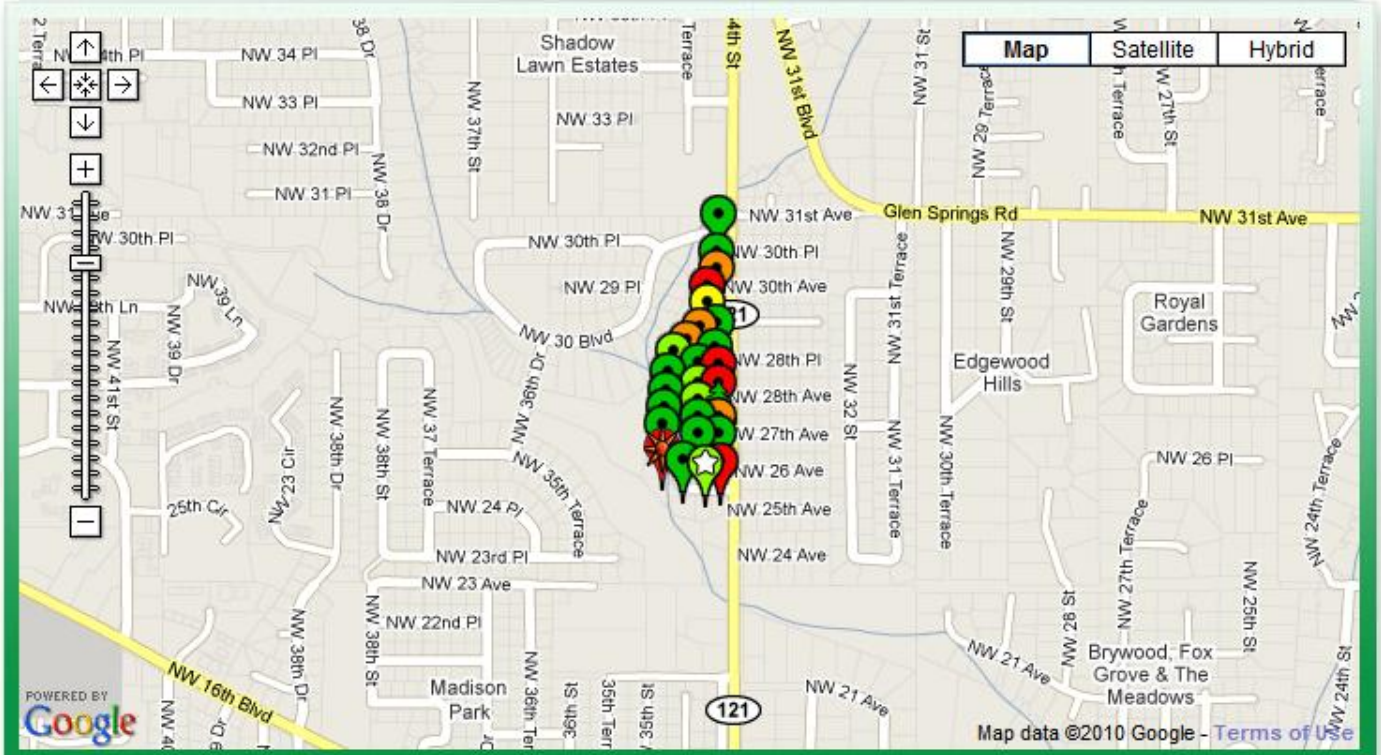
Gainesville Green
Your Home Energy Tracking Solution

Overview | FAQ | Technical Info | Blog | Feedback | Login

3423 NW 25TH PL

Electricity use in HIDDEN CREEK for 1/2010 - 12/2010

Low — Average — High



Select a date range

January 2010

December 2010

Viewing Home: 3423 NW 25TH PL

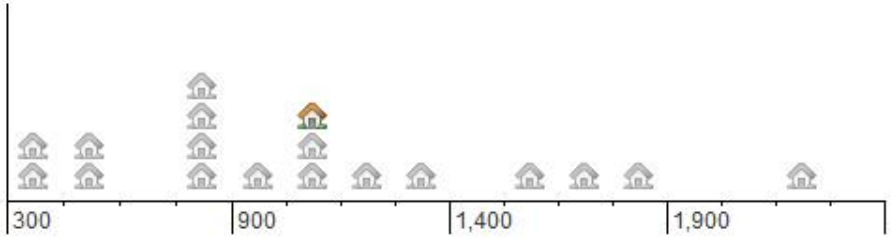
electricity | water | natural gas | Carbon Footprint | Actions

Login to Claim this Home

Electricity makes up the bulk of most energy usage. The major factors here are your air conditioner, refrigerator, clothes dryer, water heater, and stove.

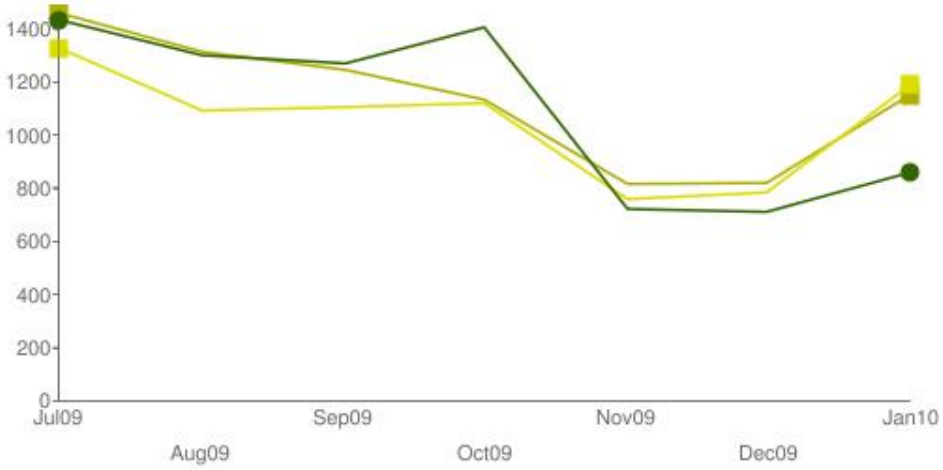
Comparing this home's electricity consumption against HIDDEN CREEK for 2010

Normalized average 2010 monthly electricity consumption (kWh)



3423 NW 25TH PL ( ) averaged 1099 kWh per month in 2010. It consumes less electricity than 39% of homes in this neighboorhood ( ).

7/2009 to 7/2010 electricity consumption (kWh)



Download electricity data

Home information:

Task Force: City Goods and Services Group

- Responsible Purchasing:
  - Reduce, reuse, recycle into purchasing practices
  - Employee education
- Recycling Issues:
  - Set waste diversion target and implementation strategy
- Landscaping:
  - Edible plants becoming a local topic
  - Native species to gradually replace typical landscaping plants

City Data Need

- Recycling: logistics and transportation of heavy bulky items (glass) make the cost benefit sometimes difficult. Can routing tools cut the cost of transport?

- Purchasing items based on life cycle is harder to sell than purchasing based on initial costs. Are there data that can make a case for this based on item type and lifespan?

- Edible landscaping needs to be carefully pursued. What are the corridors we should consider from an access and pedestrian scale perspective?

Task Force: Infrastructure Group

- Stormwater: Preparation for new regulations
  - Streetscapes that make sense for Knoxville
- Water Quality: Changing a mindset
  - Developer and Municipal regulations are changing – dealing with the unfunded mandate
- Tree roots and utilities: the competing needs of right of way utilization

City Data Need

- Green infrastructure ideas abound, but cities like Knoxville want to try the "tried and true". What best practices can we apply to our area based on:
  - Our soil substrate
  - Our rainfall amounts
  - Our climate conditions
  - Our tendency to steer clear of the cutting edge
- What practices can we incorporate that will have the most impact on water and air quality?
- Example: pervious pavement – does it work here or not? Does it clog with our seasons?

Task Force: Sustainable Growth Group

- Develop Guidelines:
  - Municipal Structures: Adopt green building policies
  - Apply BMPs through code changes and development incentives
- Address and encourage in Special Districts:
  - Energy efficiency for residential, commercial, industrial sectors
  - Tie LEED or EnergyStar certification to development incentives
- Aid Community Development's responsible rehab & growth goals:
  - Support attachment of LEED / EnergyStar certifications to grant dollars

City Data Need

- What zoning and building code measures should we employ to ensure that:
  - Energy conservation is encouraged
  - Traffic patterns make sense
  - Corridors are preserved for future transport needs
  - Developers are not further beat down in a poor economy
- What is the best way to identify good brownfield sites for redevelopment opportunities so we aren't over expanding?
- Example: Traffic patterns need to be understood to be able to make good development decisions.

Task Force: Transportation Group

- Commuter Options
  - KAT: Apply for grants to speed retrofits and replacements
  - Smart Trips: Determine alt-commute target / develop incentives
- Fleet Development
  - Determine fuel reduction target & examine vehicle / infrastructure options
  - Market development for alt-vehicles / promote alt-commutes

City Data Need

- What motivates alternative commute beyond rising fuel costs?
- What vehicles should the City purchase to both capture return on investment and save fuel?
- What's the best method to route fleets like Public Service and City workers like the building inspectors, who spend entire work days on the road?
- Example: Building Inspector has 5 stops, prioritized by time of request and construction supervisor availability. Route his day most fuel-efficiently using those considerations.

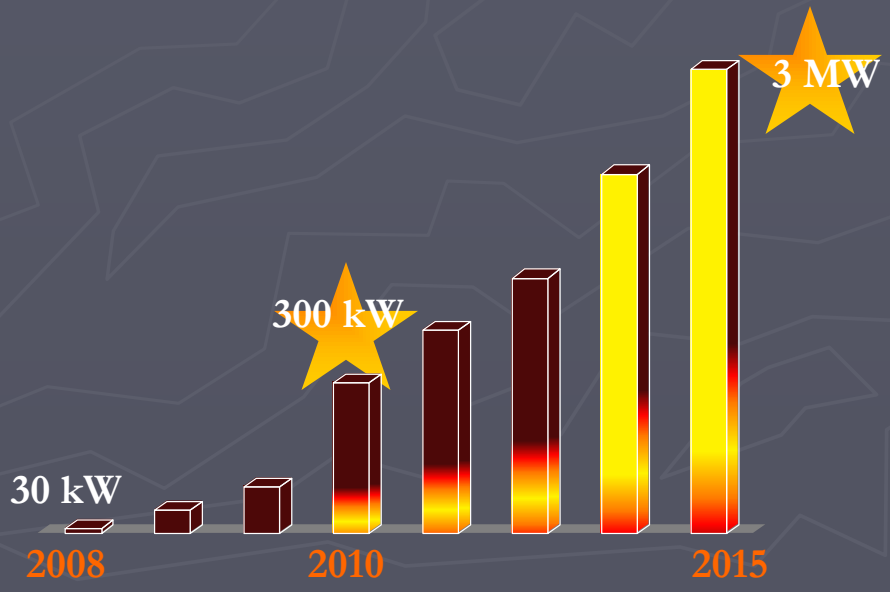
Solar Power in East Tennessee

Goals

- Build public understanding;
- Increase visibility;
- Strengthen local market capacity and expertise;
- Reduce red tape;
- Serve as a model the region.

30 kW → ***300 kW by 2010***

3 MW by 2015



City Data Need

- Where are solar energy installations – how to track "DIY" projects that may not go through permitting process?
- Where is the best location for solar?
  - Solar Intensity
  - Shading
  - Large, empty rooftops
- How to provide citizens with easy access to design, cost information about potential systems.
- City is working with ORNL to use LIDAR data to help this process.

In My Backyard (IMBY) - National Renewable Energy Laboratory - Windows Internet Explorer

http://mercator.nrel.gov/imby/

In My Backyard - National Renewable Energy Laboratory (NREL)

Pan Clear Map

Options

Use the zoom tool on the left of the map, if needed. Click the Draw button, and draw your solar array on the map. Click to add a new points. Double-click to stop drawing.

Draw

If you make a mistake, click the Clear Map button at the top of the map to start over.

Step 2. Adjust the inputs.

Based on the size and location of your system IMBY suggests these inputs. To change these values, enter your information in the fields below. Help

Size (kW):	205.86
Derating:	0.77
Tilt angle (°):	36
Azimuth angle (°):	180
Data year:	Average

Step 3. Estimate your production.

Additional Options

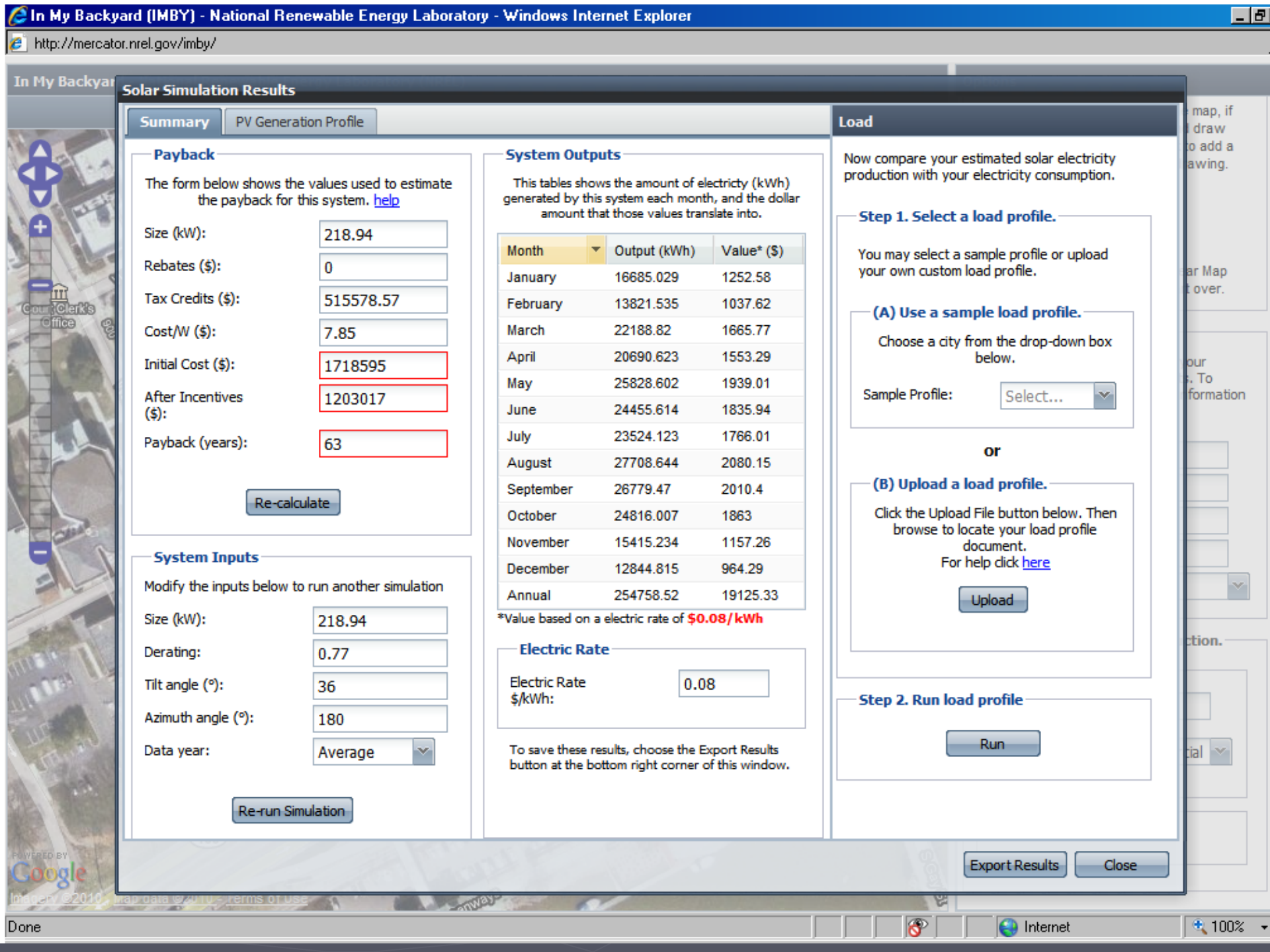
Electric Rate $/kWh:	0.09
System Type:	Commercial

Run

Done

Internet

100%


In My Backyard (IMBY) - National Renewable Energy Laboratory - Windows Internet Explorer
http://mercator.nrel.gov/imby/
Solar Simulation Results
Summary
PV Generation Profile
Payback
The form below shows the values used to estimate the payback for this system. help
Size (kW): 218.94
Rebates ($): 0
Tax Credits ($): 515578.57
Cost/W ($): 7.85
Initial Cost ($): 1718595
After Incentives ($): 1203017
Payback (years): 63
Re-calculate
System Inputs
Modify the inputs below to run another simulation
Size (kW): 218.94
Derating: 0.77
Tilt angle (°): 36
Azimuth angle (°): 180
Data year: Average
Re-run Simulation
System Outputs
This tables shows the amount of electricty (kWh) generated by this system each month, and the dollar amount that those values translate into.
Month | Output (kWh) | Value* ($)
January 16685.029 1252.58
February 13821.535 1037.62
March 22188.82 1665.77
April 20690.623 1553.29
May 25828.602 1939.01
June 24455.614 1835.94
July 23524.123 1766.01
August 27708.644 2080.15
September 26779.47 2010.4
October 24816.007 1863
November 15415.234 1157.26
December 12844.815 964.29
Annual 254758.52 19125.33
*Value based on a electric rate of $0.08/kWh
Electric Rate
Electric Rate $/kWh: 0.08
To save these results, choose the Export Results button at the bottom right corner of this window.
Load
Now compare your estimated solar electricity production with your electricity consumption.
Step 1. Select a load profile.
You may select a sample profile or upload your own custom load profile.
(A) Use a sample load profile.
Choose a city from the drop-down box below.
Sample Profile: Select...
or
(B) Upload a load profile.
Click the Upload File button below. Then browse to locate your load profile document.
For help click here
Upload
Step 2. Run load profile
Run
Export Results
Close
Done
Internet
100%

http://gis.cityofboston.gov/solarboston/ - Windows Internet Explorer

http://gis.cityofboston.gov/solarboston/

File Edit View Favorites Tools Help

http://gis.cityofboston.gov/solarboston/

City of Boston.gov

Projects Layers Tools About

Zoom to Neighborhood

Street Terrain Aerial

BELMONT

CHELSEA

WATERTOWN

CAMBRIDGE

Charlestown

WINTHROP

East Boston

North End

Beacon

Allston

Brighton

Back Bay

Fenway

South End

BROOKLINE

Mission Hill

Roxbury

BROOKLINE

Jamaica Plain

Dorchester

West Roxbury

Park Street School

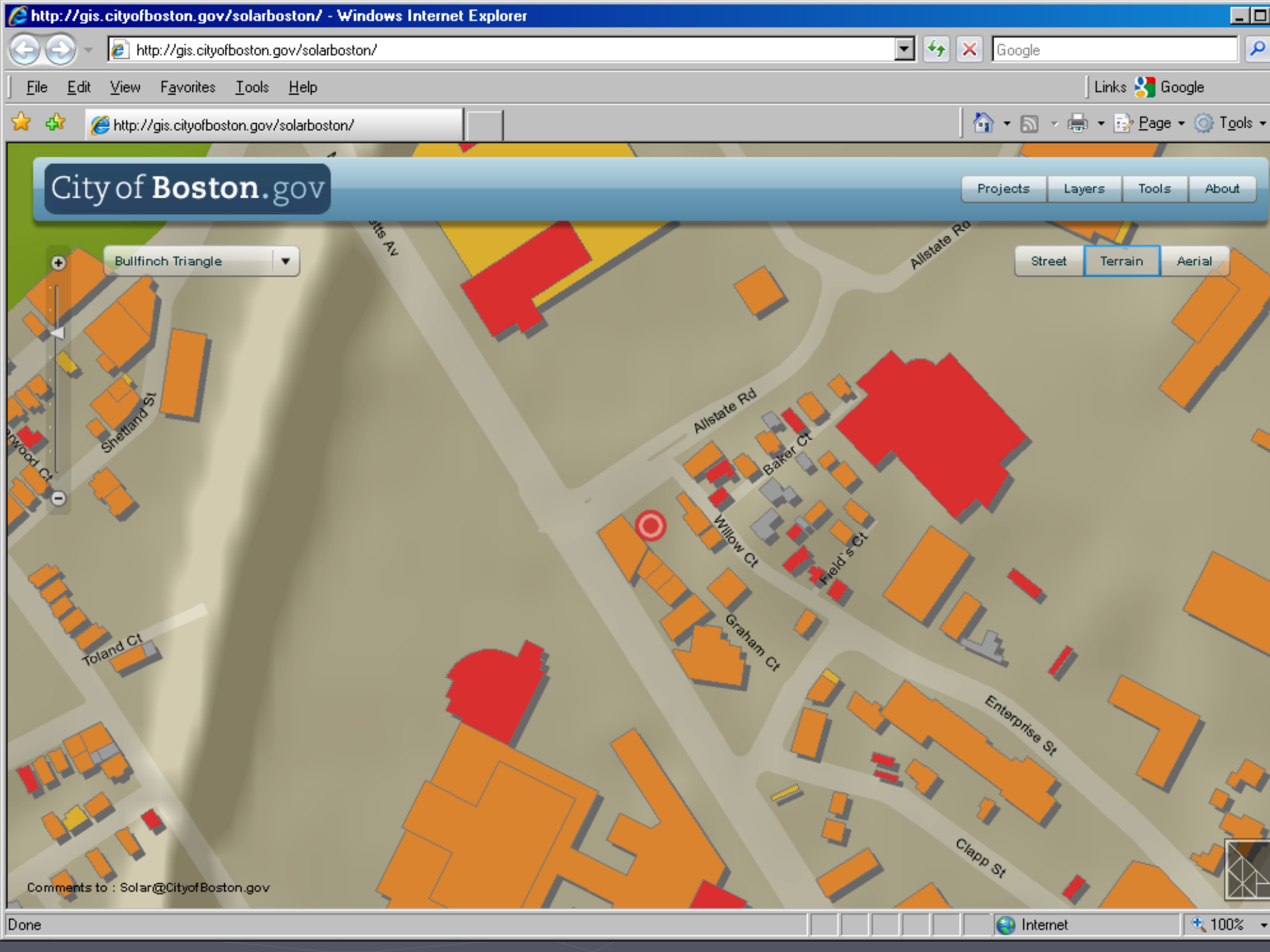
Location : Beacon Hill
Type : Solar - Water Heating
kW Rating : 4.5
Installer : Synepex
Note :

Comments to : Solar@CityofBoston.gov

Done

Internet

100%


http://gis.cityofboston.gov/solarboston/ - Windows Internet Explorer
http://gis.cityofboston.gov/solarboston/
File Edit View Favorites Tools Help
Links Google
City of Boston.gov
Projects Layers Tools About
Bullfinch Triangle
Street Terrain Aerial
Allstate Rd
Baker Ct
Willow Ct
Field's Ct
Graham Ct
Shetland St
Toland Ct
Enterprise St
Clapp St
Comments to : Solar@CityofBoston.gov
Done
Internet
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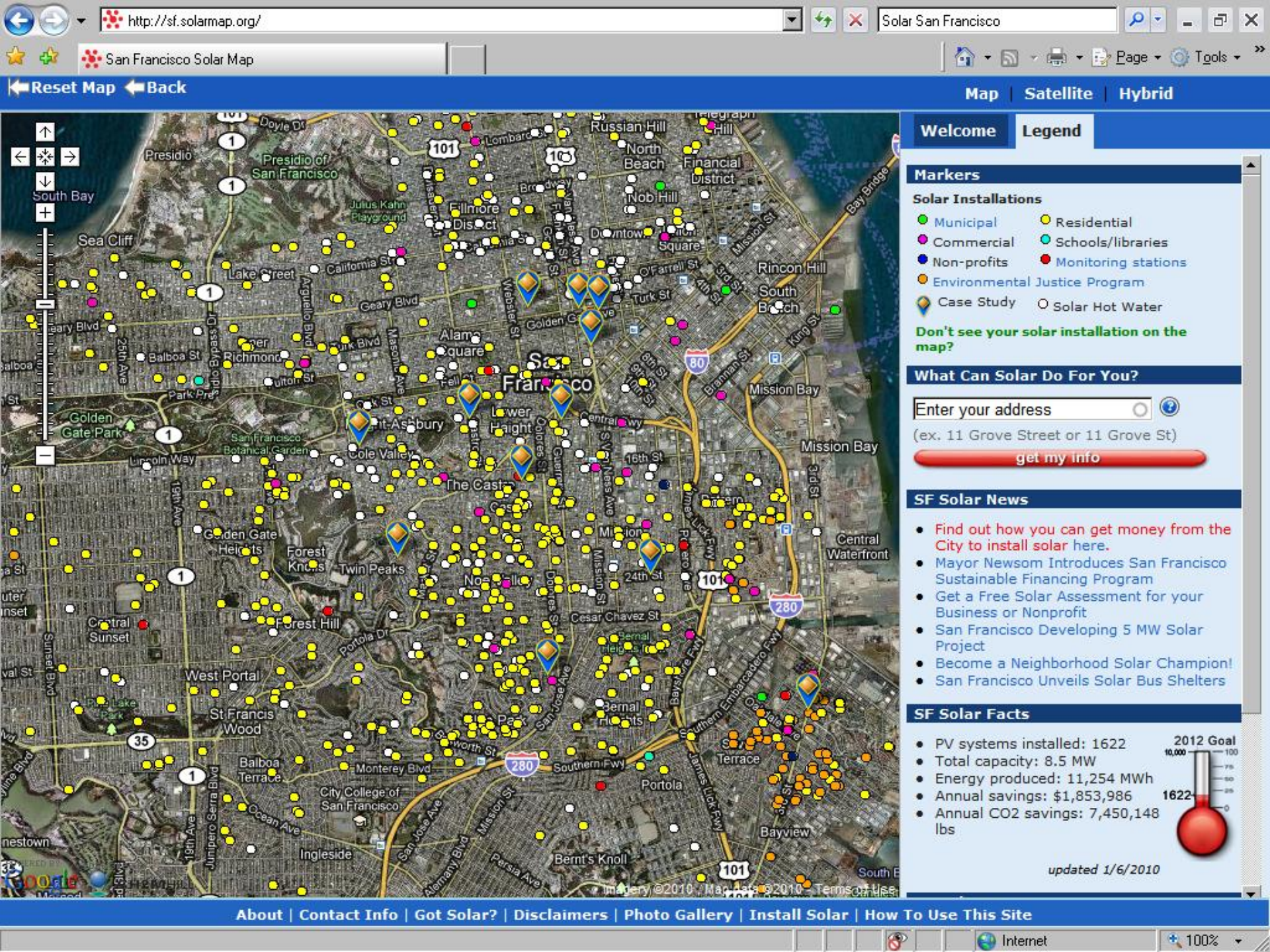

http://sf.solarmap.org/
Solar San Francisco
San Francisco Solar Map
Page
Tools
Reset Map
Back
Map | Satellite | Hybrid
Welcome
Legend
Markers
Solar Installations
Municipal
Residential
Commercial
Schools/libraries
Non-profits
Monitoring stations
Environmental Justice Program
Case Study
Solar Hot Water
Don't see your solar installation on the map?
What Can Solar Do For You?
Enter your address
(ex. 11 Grove Street or 11 Grove St)
get my info
SF Solar News
Find out how you can get money from the City to install solar here.
Mayor Newsom Introduces San Francisco Sustainable Financing Program
Get a Free Solar Assessment for your Business or Nonprofit
San Francisco Developing 5 MW Solar Project
Become a Neighborhood Solar Champion!
San Francisco Unveils Solar Bus Shelters
SF Solar Facts
PV systems installed: 1622
Total capacity: 8.5 MW
Energy produced: 11,254 MWh
Annual savings: $1,853,986
Annual CO2 savings: 7,450,148 lbs
2012 Goal
10,000
1622
updated 1/6/2010
About | Contact Info | Got Solar? | Disclaimers | Photo Gallery | Install Solar | How To Use This Site
Internet
100%

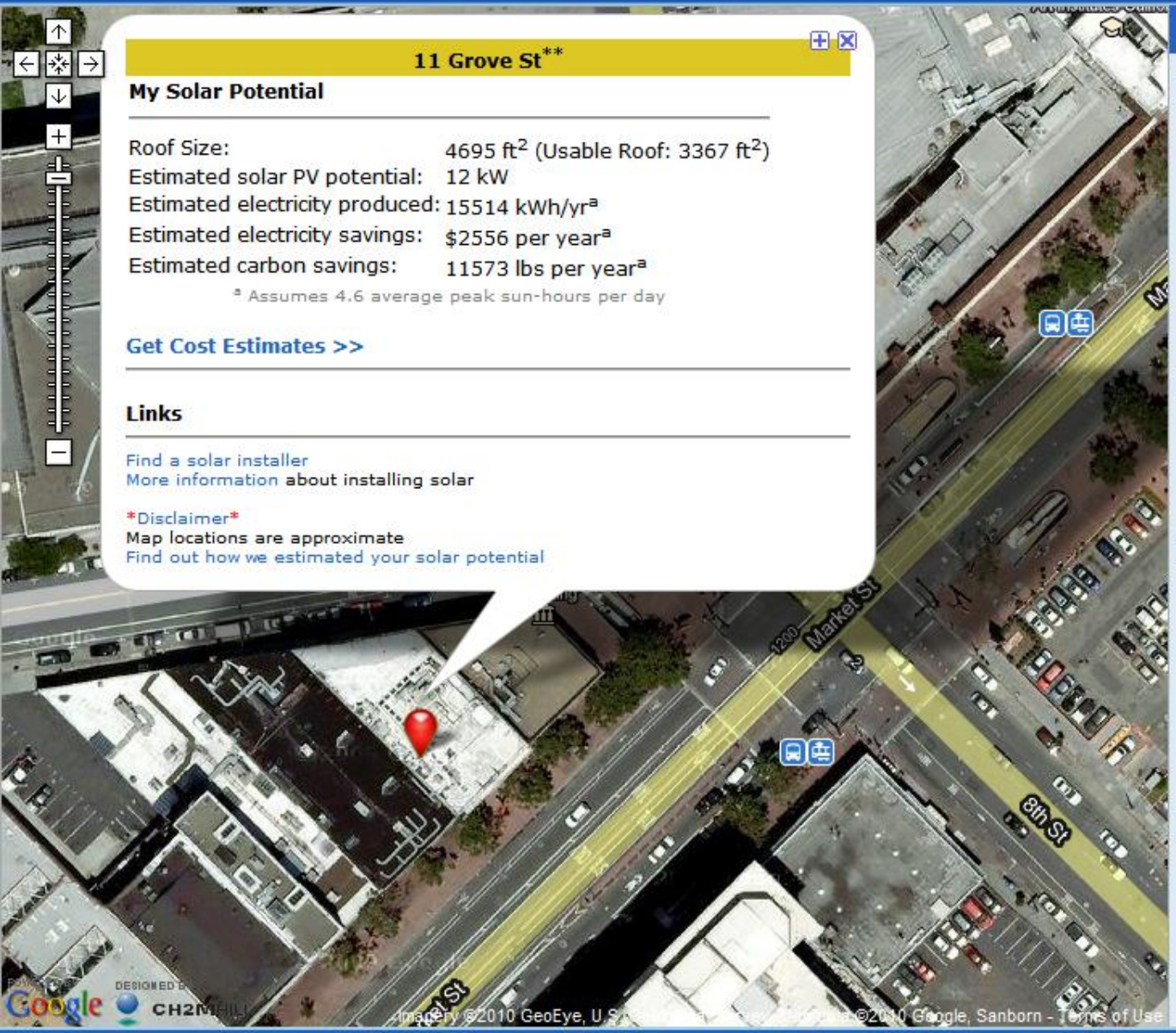
San Francisco Solar Map

A MAP OF SOLAR ACTIVITY AROUND THE CITY

SF Environment | CH2MHILL

Reset Map | Back

Map | Satellite | Hybrid



11 Grove St**

My Solar Potential

Roof Size:	4695 ft² (Usable Roof: 3367 ft²)
Estimated solar PV potential:	12 kW
Estimated electricity produced:	15514 kWh/yr[a]
Estimated electricity savings:	$2556 per year[a]
Estimated carbon savings:	11573 lbs per year[a]

[a] Assumes 4.6 average peak sun-hours per day

Get Cost Estimates >>

Links

Find a solar installer
More information about installing solar

Disclaimer
Map locations are approximate
Find out how we estimated your solar potential

Welcome | Legend

Markers

Solar Installations

- Municipal
- Residential
- Commercial
- Schools/libraries
- Non-profits
- Monitoring stations
- Environmental Justice Program
- Case Study
- Solar Hot Water

Don't see your solar installation on the map?

What Can Solar Do For You?

11 Grove St

(ex. 11 Grove Street or 11 Grove St)

get my info

SF Solar News

- Find out how you can get money from the City to install solar here.
- Mayor Newsom Introduces San Francisco Sustainable Financing Program
- Get a Free Solar Assessment for your Business or Nonprofit
- San Francisco Developing 5 MW Solar Project
- Become a Neighborhood Solar Champion!
- San Francisco Unveils Solar Bus Shelters

SF Solar Facts

- PV systems installed: 1622
- Total capacity: 8.5 MW
- Energy produced: 11,254 MWh
- Annual savings: $1,853,986
- Annual CO2 savings: 7,450,148 lbs

About | Contact Info | Got Solar? | Disclaimers | Photo Gallery | Install Solar | How To Use This Site

Internet 100%

Ongoing Sustainability:

Other Initiatives

Electric Vehicle Technology: Deployment and Charging

The EV Project Partnership:

- National ARRA-Funded Initiative
- Nissan LEAFs and Chevy Volts
- ~300 Publicly-Accessible Charging Stations
- Monitoring of Driving and Charging Patterns

THE EV Project

City Data Need

- Where should Charging Infrastructure be located?
  - Current Commuter Patterns
  - Early Adopter EV Driver Habits
  - Future Commuter Patterns, Driver Habits
  - Strength of Supporting Utility Infrastructure
- How should City plan for growth in EV Deployment over next 10 Years?
- How do EVs change our future City planning/design efforts?

LED Technology: Street & Traffic Lights

Streetlight LED Pilot:

- EPRI, TVA, KUB, COK project
- Installed 12 downtown LED streetlights
- Wall Ave. (10 – 2 Left, 8 Right) and Market Square (2)
- Greater upfront costs: $289 more per unit
- Initial energy reduction: 69%, or less 2,190 watts or 2.54 kwh used
- LED claims 5 times HPS lifespan
- EPRI to monitor

Traffic Signal Update:

- 90% energy savings
- Reduced maintenance
- $280,000 in savings annually

City Data Need

- What's the best lighting product to use now for the long term?
- How does a City decide what fixture to use in a field that is moving so quickly?
- On what data does a City who is still using mercury vapor and high pressure sodium decide to convert to induction lighting, metal halite, or LED?
- Example: Pilot on Lovell Road is testing induction, LED, and metal halite together for energy savings, but it's a huge step to invest in wholesale fixtures when the field is evolving so rapidly.

Web & Contact Information

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